

What I claim is:

1. A method of optimizing a magnetic core, the core having inner and outer radii and wire windings, comprising the steps of:

- a) allowing the core radii to change parametrically in a nested loop;
- b) computing core reluctance, number of turns, and winding resistance for each position;
- c) computing the maximum induced membrane voltage based on the following equation:

$$V_m(t) = f \sqrt{\frac{2W}{\Re}} \omega \tau_L (4\omega^2 \tau_L^2 - 1) \cdot \left(e^{-\frac{t}{2\tau_L}} \cos(\beta) + \frac{e^{-\frac{t}{2\tau_L}} (2\tau_L \tau_m \omega^2 - 1) \sin(\beta)}{\sqrt{4\omega^2 \tau_L^2 - 1}} - e^{-\frac{t}{\tau_m}} \right) ;$$

$$4\omega^4 \tau_m^2 \tau_L^3 + \omega^2 (4\tau_L^3 - \tau_m^2 \tau_L) + (\tau_m - \tau_L)$$

$$\text{where } \beta \equiv \frac{1}{2} \sqrt{\frac{4\omega^2 \tau_L^2 - 1}{\tau_L^2}} t.$$

d) fitting a membrane voltage to the inner and outer radii using a multi-variable spline analysis; and

e) using a variable metric sequential quadratic program algorithm to compute the combination of inner and outer radii that maximizes the peak membrane voltage.

2. A method according to Claim 1 further comprising the step of:
f) repeating step e) with a Monte-Carlo starting guess algorithm ,
wherein said step f) insures that a global maximum is found.
3. A method according to Claim 1, wherein said method is performed with a preselected wire size.
4. A method according to Claim 1, further comprising the initial step of selecting a wire size.
5. A method according to Claim 2, further comprising the initial step of selecting a wire size.
6. A method according to Claim 4, further comprising the steps of:
g) selecting different wire sizes, and
h) repeating steps a-f for each different wire size selected.
7. A method according to Claim 5, further comprising the steps of:
g) selecting different wire sizes, and
h) repeating steps a-f for each different wire size selected.
8. A method according to Claim 6, further comprising the step of:
i) selecting the wire size which maximizes the membrane voltage.

9. A method according to Claim 7, further comprising the step of:
 - i) selecting the wire size which maximizes the membrane voltage.
10. A magnetic core produced by the method of Claim 1.